

but during the fourth hour it dropped to 0.07 per cent., and after the fourth hour the qualitative test gave a negative result. Obviously in such cases as F. T. the ordinary qualitative test on an occasional specimen may be very misleading.

Further presentation of figures seems unnecessary in order to emphasize the practical value of the work outlined above. The use of the method demonstrates more clearly than ever before the error of the idea that glycosuria is a sudden phenomenon. The elimination of sugar through the urine is a continuous process, quite independent of the volume of the urine, but showing a definite increase after the ingestion of food. This increase in absolute quantity of sugar in the urine, or glycuressis, as Benedict calls it, follows in a greater or less degree the mere process of digestion, although the actual food consumed may contain no sugar whatever.

Along with this deeper conception of sugar excretion the new method affords the clinician valuable aid in the attempt to diagnose and treat cases in which as yet the sugar tolerance is only slightly lowered. Because of the low concentration of the sugar in the urine the old qualitative tests with copper solutions may frequently give misleading results in cases of slightly lowered sugar tolerance, but the use of the new technic on a twenty-four hour specimen makes an accurate determination of the exact sugar output a relatively simple matter. An occasional determination of this sort could scarcely fail to be of far greater value in the treatment of the case than the customary qualitative analysis.

Conclusion. It would appear from qualitative sugar observations on hourly specimens of urine, a few of which are given in the present paper, that the results obtained with the usual qualitative tests made upon specimens of urine taken at random, or even in the morning before breakfast, are quite misleading as regards the carbohydrate tolerance of the patient.

PATHOGENESIS OF ACUTE LEUKEMIA: REPORT OF A CASE OF ACUTE MYELOBLASTIC LEUKEMIA, WITH THE ASSOCIA- TION OR COMPLICATION OF VINCENT'S ANGINA.

By MAURICE PACKARD, M.D.,

AND

EDWARD P. FLOOD, M.D.,

(From the Department of Medicine, Gouverneur Hospital, Dr. Camac, Director.)

PATIENT, R. M., nativity, Poland; occupation, operator; aged twenty-six years. Admitted to Gouverneur Hospital, March 7, 1920. Died March 12, 1920.

Family History. Ignorant of conditions of relatives in Poland. Knows of nothing unusual in family.

Previous History. Patient is married. In addition to her household duties she worked daily as an operator in a clothing factory. Usual diseases of childhood. Denies venereal infection. Her health has always been good. She has been married seven months. No pregnancies. Menses regular. No previous attacks.

Present History. Patient was in excellent health until two weeks prior to admission. Her illness dates from a day on which she washed her hair, and before it was dry she went into the street to do her marketing. Shortly after her return there developed a severe headache, and her ears, neck and shoulders pained her. These complaints continued, and shortly afterward she noticed a sore on the mucous membrane of the right cheek. This rapidly spread until it involved the gums of the upper right alveolar ridge and the mucous membrane of the hard palate. Coincident with the extension of the lesion in the mouth there developed a swelling under the jaw, first on the right side and then on the left side. As this swelling increased in size it became difficult for her to swallow or to speak. She cannot state whether she had a fever. She was refused treatment for her mouth lesion at one of the hospitals of the city. A neighbor cared for her, with various mouth washes, until the odor from the sore in the mouth became foul. Patient then sought admission to the hospital.

General Appearance. Recumbent adult; female; pallor marked; face and neck swollen; some difficulty in breathing.

Eyes: Pupils equal and regular, react to light and accommodation. *Mouth:* Patient breathes through the open mouth; teeth in poor condition; gums slightly congested; no bleeding from gums; there is a foul-smelling, black, membranous exudate, with a well-defined margin on the roof of the mouth extending slightly beyond the midline on the left and continuous with a like lesion on the gums of the right upper alveolar ridge; there are several lesions of similar appearance on the right cheek, the left cheek and the left upper alveolar ridge on its external surface.

Tongue: Slightly swollen; no leukoplakia or other lesions.

Throat: Swelling of right peritonsillar tissue; right tonsil prominent but is free of exudate; pain and fluctuant sensation elicited pressure over the right antitonsillar pillar; there is inability to separate the jaws more than three-quarters of an inch.

Neck: Painful, massive and conglomerated swelling of submaxillary lymph nodes on both sides, the right more prominent than the left.

Heart: No enlargement; no thrill; no abnormal impulse; rate increased; no murmurs; sounds feeble.

Arteries: Negative.

Pulse: Tension fair, quality poor.

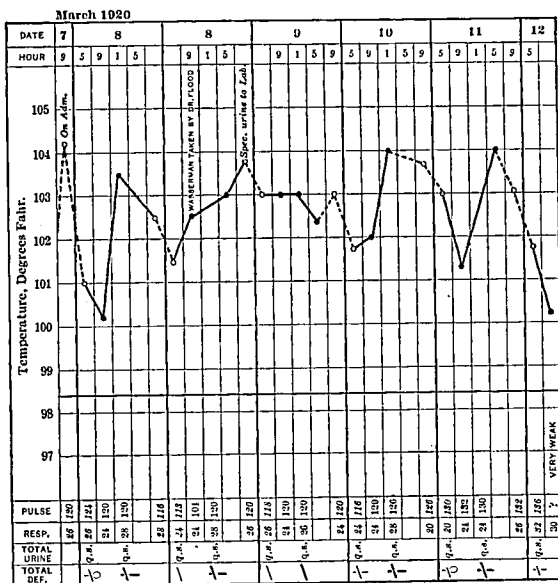
Lungs: Slight dulness; cogwheel breathing at right apex posteriorly; clear and resonant elsewhere.

Abdomen: Scaphoid; no rigidity; no masses.

Liver: Not enlarged.

Spleen: No enlargement made out on percussion and palpation.

Kidneys: Not felt.



Skin: Pronounced eczema of scalp; numerous small hemorrhages along hair line of forehead.

Skeletal Structures: Negative.

Lymphatic System: Discrete and shotty enlargement of post-cervical, epitrochlear and inguinal lymph nodes.

Reflexes: Present and active.

CLINICAL PATHOLOGY.

March 8, 1920. *Urine.* Transparency, cloudy.

Color, amber.

Reaction, alkaline.

Albumin, heavy cloud. Glucose, 0.

Stained smear of mouth lesions shows many spirilla and fusiform bacilli.

Acetone, 0.

Casts, many.

Leukocytes and pus, few white cells.

March 8. Culture of mouth lesions negative for *Bacillus diphtheria*.

BLOOD EXAMINATION.

March 9, 1920. Leukocytes, 190,000.

Number of cells counted, 300.

Polynuclears, 290.

Transitionals, 15. March 10, Wassermann negative.

Lymphocytes, 26.

Myelocytes, 18.

Myeloblasts, 10.

Hb. per cent., 60. Instrument, Sahli.

Erythrocytes, 2,950,000.

Normoblasts, 2.

March 12. Blood smears, reported by Dr. L. Unger, showed nucleated red blood cells together with anisocytosis and poikilocytosis. There is a tremendous increase in the number of white blood cells, which are chiefly myeloblasts. One per cent. myelogenes, a forerunner of the myeloblast is present. A large percentage of the myeloblasts show evidence of considerable degeneration. In the body of some myeloblasts an erythrocyte is seen. This ingestion of erythrocytes is evidence of the terminal stage of the disease. A small percentage of myelocytes are present.

The smear stained for the oxidase reaction is positive. The differential count of the white blood cells on March 10, 1920, date of death, were as follows:

Polymorphonuclears: Neutrophiles, 3 per cent.; eosinophiles, 0 per cent.; basophiles, 0 per cent.

Small lymphocytes, 3 per cent.

Large lymphocytes, 0 per cent.

Myeloblasts, 90 per cent.

Myelocytes, 3 per cent.

Myelogenes, 1 per cent.

Anisocytosis, moderate.

Poikilocytophilia, moderate.

Polychromatophilia, none.

REPORT OF SOCIAL SERVICE INVESTIGATION.

Home of patient fairly clean; no stove in rooms; patient did cooking on neighbor's stove; patient and husband worked during day; neighbors state that their food was apparently adequate and of good quality.

March 8. Patient examined by nose and throat consultant. Suspicion of scorbutus. Findings: marked necrosis of the lower jaw. Severe tenderness on pressure over the right canine fossa.

March 9. Patient breathing easier; less apathy; no improvement in mouth lesions.

March 11. Patient much weaker; takes no food; marked inspiratory dyspnea.

Diagnosis: Acute myeloblastic leukemia.

Treatment: Consisted of arsphenamin locally to mouth and intravenously.

When one has the opportunity of studying a case of acute leukemia he must necessarily be impressed with its peculiarly infectious-like type of onset and course. Yet strange as it may seem to him the conclusion that acute leukemia is an infection has been held as untenable by a number of competent investigators.

Since the day of Newman, who in 1870 showed the marrow lesions in leukemia, the contention of Lowitz, who held that leukemia was a disease of the blood itself, has been discarded. Although the bone-marrow, and especially the lymphoid tissue of true bone-marrow, has been accepted as the principal affected tissue, yet the exciting cause is still surrounded with a great deal of uncertainty. The widespread occurrence of leukemia in all animals, according to Warthin, speaks against infection and corresponds to a neoplastic growth. One cannot help wonder if it is a tumefaction or a sarcomatous condition (Banti), why the condition does not progress in a steady advance and why the blood does not correspond to the condition. The peculiar remissions which occur so frequently do not correspond to the usual course of a tumor. The spontaneous *bona fide* cases of cure, which occur in myeloblastic leukemia, again seem to us to oppose the theory of tumefaction. A white blood count under 25,000, notwithstanding the number of myelogenes, myeloblasts or other cells, augurs well for the patient, and a cure in such instances can at least be hoped for.

Although no specific organism has been satisfactorily demonstrated as the etiologic agent in leukemia, still there has been quite an accumulation of corroborative evidence that the basic factor in its production must be an infection.

Ellermann and his co-workers in Copenhagen claimed to have produced either myeloid or lymphatic leukemia or an anemia without leukemia in chickens by means of a filtrable virus. Although his work has been impressive, still others and very competent workers were unable, with practically the same technic to produce his results. It is well to recall here that chicken leukemia is not exactly like human leukemia for chickens do not have lymph nodes, with the exception of the cervical region, and this corresponds histologically to the thymus in the human. Clinically therefore we would not have any lymphatic swellings, an important sign in true leukemia.

The literature abounds with other claims of certain bacteria producing the lesion. Cabot presents an interesting contribution but not conclusive by any means, because of the dangers of coincidence, of a nurse who became a victim of leukemia while nursing a leukemic patient. Again, there have been the stories of the epidemic of leukemia, one in the valley of Enz in 1905 and another in Toulouse in 1912. The stories of these epidemics can hardly stand the light of day, as the record, for instance in Toulouse, of 18 cases of all classes of leukemia in twenty-two months wherein previously leukemia was very rare in this region, counts very little as a bullet-proof conclusion.

In rebuttal of their evidence and thinking from an infectious standpoint, it is rather hard to reconcile the incontrovertible proofs of cases wherein a number of leukemic mothers have given birth to healthy children. There are at least a dozen of such instances in the literature.

There is no question that the clinical symptoms, such as the temperature, swollen spleen, hemorrhagic condition of the mouth, tonsils and intestinal symptoms, would make one favor an infectious origin, but in leukemia we have so many secondary invaders that it is difficult to recognize just what symptoms are really leukemic and just what are due to a secondary invader.

Dorothy Reed, in her opinion, has summed up the evidence very tersely when she says that it is due to some chemotaxis in some part of the body, with a peculiar predilection for myeloid tissue.

Packard and Ottenberg have described a peculiar leukotoxic state in the lymphatic variety.

Bearing upon our own work it is well to recognize that in lymphatic leukemia about one-tenth of the leukocytes are absolutely in a degenerative state, and in one case reported by Emerson the leukocytes would not stain at all.

It is interesting to note that Rotky, in 1900, stated that the blood in leukemia has no agglutinating power to bacteria and that, to my mind, not only explains the apparent incapacity for production of antibodies, but also explains the lack of resistant power in leukemic patients to otherwise harmless infections. Again, it gives us a practical clue to the number of bacteria which have been brought forward as the specific etiologic agent.

Sondern, in a personal communication (although he feels that he is not quite justified to report this) feels that in a number of instances Vincent's organisms might have been the exciting factor. He has found Vincent spirillum and the fusiform bacillus in twenty-two cases, and in two cases he is convinced that it preceded the leukemia and was the important agent in causing the condition. In two other cases he has had a lymphemic state with over 95 per cent. of lymphocytes. In one case of a child, nine years elapsed before the blood returned to normal and in another case an interval of five years before the blood again became normal.

Again and again I am seeing severe lymphemias with symptoms of leukemia, which after a time proceed to get well so that we necessarily hesitate now and then to give a hopeless prognosis as one ought to if he were absolutely certain that he was dealing with leukemia.

In the army Vincent's angina was considered a very harmless infection. It was found most often in trench mouths. But in our experiences when it is associated with leukemia it is a most potent factor in producing an early death.

To summarize then the complete story of the etiology, leukemia still has an unfinished chapter. The evidence in favor of an infectious theory is rather preponderating, but still far from conclusive. The best we can say as to its causation is to requote Dorothy Reed, when she concluded that it is due to some chemotaxis, with a special predilection for the bone-marrow.

REFERENCES.

1. Ellermann: Berl. klin. Wehnschr., July, 1915.
2. Ellermann: Ztschr. f. klin. Med., July, 1913.
3. Ellermann: Ztschr. f. klin. Med., July, 1913.
4. Ellermann: Ztschr. f. klin. Med., July, 1915.
5. Ellermann and Bang: Centralbl. Bakt., 1908.
6. Warthin: Jour. Infect. Dis., 1907.
7. Warthin: Tr. Assn. Am. Phys., 1904.
8. Schridde: Deutsch. med. Wehnschr., 1909.
9. Rotky: Centralbl. f. inn. Med., vol. xliii.
10. Reed, Dorothy: Am. Journ. Med. Sc., 1902.
11. Emerson, Chas. P.: Johns Hopkins Hosp. Bull., 1907.
12. Cabot: Boston Med. and Surg. Jour., 1894.
13. Brastzow, O.: Deutsch. med. Wehnschr., 1890.
14. Nauta, A.: Provine Med., September, 1912.
15. Lowitz: Congress inn. Med., pp. 251.
16. Peterson: Arch. f. Gynäk., Jour. Am. Med. Assn., January, 1915.
17. Länger: Arch. f. Gynäk., 1888.
18. Tommel: München. med. Wehnschr., 1905.
19. Peterson: Edinburgh Med. Jour., 1870.
20. Doch and Warthin: Med. News, 1901.
21. Klein, Stan.: Deutsch. med. Wehnschr., 1913.
22. Klein, Stan.: Monographs.

THE CONTENTS OF THE STOMACH: ITS STUDY AND INTERPRETATION.

By ELBRIDGE J. BEST, M.D.,

SAN FRANCISCO, CALIF.

By glancing through the literature one sees the wide acceptance of the small tube as a means of removing the stomach contents by the fractional method, thus enabling one to study the activity of the stomach continuously over a period of hours. Although used by Europeans as early as 1912,¹ it was first brought to the attention of